

SYLLABUS FOR Ph.D. ELIGIBILITY ENTRANCE TEST

BOTANY



**VINOBA BHAVE UNIVERSITY, HAZARIBAG
(JHARKHAND)**

Microbiology, Phycology & Mycology

1. Ultra structure of bacterial cell
2. Reproduction and genetics of bacteria, transformation, conjugation, transduction
3. Structure and nature of plant viruses with emphasis on TMV and bacteriophages
4. Thallus organisation in algae.
5. Algal blooms and Algal biofertilizers
6. Heterothallism, Heterokaryosis, Parasexuality.
7. Fungi in industry, medicine and as food, Mycotoxines
8. Mushroom cultivation
9. Mycorrhizae: General account, their role and applications in agriculture and forestry

Cell biology, Molecular biology & Cytology

10. Chromosome structure and packaging of DNA, Euchromatin and heterochromatin, banding patterns, Specialized types of chromosomes: - B-chromosomes, sex chromosomes, polytene chromosomes
11. Structural alterations in chromosomes: origin, meiosis and breeding behaviour of duplication, deficiency, inversion and translocation heterozygotes.
12. Numerical alterations in chromosomes: Origin, Occurrence, Production and Meiosis of haploids, Euploids and Aneuploids; Origin and production of autopolyploids; types, genome constitution and analysis of Allopolyploids, induction and characterization of trisomics and monosomics, effect of aneuploidy on phenotype in plants.
13. Mutations: spontaneous and induced mutations, physical and chemical mutagens; molecular basis of gene mutations; mutations induced by transposons; site directed mutagenesis.
14. DNA structure: A, B and Z forms of DNA; replication, damage and repair mechanism.

Plant Physiology and Biochemistry

15. Enzymes: Nomenclature, classification, nature and properties. Coenzymes and prosthetic groups; Enzyme Kinetics, Mechanism and mode of enzyme action; active site, Activator and Inhibitory, Isoenzymes, Allosteric enzymes, Ribozyme, factors affecting enzyme activity; Enzyme immobilization.
16. Photosynthesis: Photosynthetic apparatus and pigments, Electron transport and photophosphorylation; C₃ & C₄ and CAM pathway, Photorespiration, Glycolyte metabolism.
17. Respiration: Glycolysis; Tricarboxylic acid cycle; Pentose phosphate pathway; Electron Transport System and Oxidative Phosphorylation.
18. Phytohormones: Chemical nature, biosynthesis, Mode of action and role of auxins, Gibberellins, Cytokinins, ABA and Ethylene.

Ecology and Environmental Biology

19. Modern concept, structural components, trophic structure, food chain, food web and ecological pyramids.

20. Dynamics: succession – Hydrosere and Xerosere.
21. Water pollution: sources, effect and control with emphasis on Eutrophication.
22. Forest: Forest types found in India, importance of forest, strategies for conservation and management of forest with special reference to deforestation, Chipko Movement, Social forestry, Biosphere reserve and Gene bank; National forest policy.
23. Soil: Soil erosion and conservation.
24. (a) Biosphere (b) Endemism (C) Bioindicators (d) Wasteland reclamation
(e) Environmental Impact assessment (f) Damodar Basin.

Plant Biotechnology

25. Plant Cell and Tissue culture: General introduction, History, Scope, concept of cellular differentiation, totipotency; Principals and techniques of cell and tissue culture.
26. Protoplast Culture and Somatic Hybridization: Cybrids.
27. Anther and Pollen Culture: Haploidy.
28. Tools for genetic engineering with special reference to Restriction endonucleases, Vectors: Plasmids, Cosmids and Phages.
29. Constructing of genomic and c DNA libraries and their uses.
30. Polymerase chain reaction (PCR); DNA fingerprinting.
31. Gene transfer in plants: Vectors mediated transformations: *Agrobacterium*- The natural genetic engineer, methods of gene transfer.
32. Molecular markers (RFLP, VNTR)

Bryophyta, Pteridophyta and Gymnosperm

33. Evolution of gametophyte and sporophyte in Bryophytes.
34. Fossil Bryophytes.
35. Stelar organization and its evolution in Pteridophytes.
36. Telome concept: its merits and demerits.
37. Heterospory and seed habit in Pteridophytes.
38. Distribution of living and fossil gymnosperms in India.
39. Ginkgoales.
40. Gnetales (with emphasis on angiospermic features).
41. Apogamy, apospory and parthenogenesis.

Systematic Botany, Anatomy and Embryology

42. Taxonomic evidence: Morphology, Anatomy, Palynology, Embryology, Cytology, Phytochemistry, Genome analysis and Nucleic acid hybridization.
43. System of angiosperm classification: Phenetic vs phylogenetic system, Cladistics in taxonomy; relative merits and demerits of major system of classification, relevance of taxonomy to conservation.
44. Apical meristem: Shoot apex and root apex organisation.
45. Periderm : Formation and functions, lenticels, abscission and wound healing.
46. Vascular cambium (structure and functions)
47. Endosperm: Development, types, functions, cytology, morphogenetic studies.

48. Polyembryony – Causes, experimental induction, classification, practical value.

49. Apomixes, diplospory, Apospory : Parthenogenetic development of embryos.

Resource Biology

50. Origin, evolution, botany, cultivation and uses of the following with special reference to

Jharkhand:

- i. Food, forage and fodder crops
- ii. Fibre crops
- iii. Medicinal plants
- iv. Aromatic plants
- v. Vegetable oil yielding crops

51. Role and impact of the following:

- i. Remote sensing
- ii. Floriculture
- iii. Dry-land farming
- iv. Agro forestry
- v. Organic farming